

Reclassification of *Prenanthes pendula* (Asteraceae: Lactuceae)

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Abstract

The species with uncertain taxonomic position, *Prenanthes pendula* SCH. Bip., was studied in respect of morphology, anatomy and surface ultrasculpture of achenes. The structure of its pericarp is similar to that in species of *Sonchus* subgen. *Dendrosonchus* to which this species is to be attributed.

Introduction

The taxonomic position of *P. pendula*, endemic to the Canary Islands, has always been unclear. First described as a member of the genus *Prenanthes* (WEBB & BERTHELOT 1842-1850), this species remains static in the Lactuceae (Cichorieae), even though the protologue of this name includes the remark by P. WEBB on its possible relationship to *Sonchus*: "*Sonchus (Picrosonchus) pendulus* WEBB, in litt." (l. c.: 421).

This characteristic species is the only member of *Prenanthes* from the Canary Islands, inhabiting mountain cliffs on Gran Canaria (BRAMWELL & BRAMWELL 1974). This species is characterized by a woody basal stem, pinnatisect leaves with large triangular lobes, corymbose inflorescence with small calathidia of 5–6 florets (each), smooth, 4–5-striate achenes and thin white subglabrous submonomorphic pappus setules. Considering its special habit, *P. pendula* is rather similar to Canarian species of *Sonchus* sect. *Atalanthus* (D. DON) DC. (syn. *Taeckholmia* BOULOS) and *S. tuberifer* SVENT. (sect. *Tuberiferi* BOULOS).

In recent years doubt was thrown upon the former position of *P. pendula*. Some morphological and biological data (PEREZ DE PAZ 1976) facilitated the suggestion that *P. pendula* is closely related to *Sonchus* and *Sventenia* (small monotypic segregate close to *Sonchus*). A naturally occurring hybrid between *Sventenia bupleuroides* FONT

QUER and *P. pendula* was reported by SVENTENIUS (1960). The relationships drawn from the results of the study of sequences from the internal transcribed spacer region of nuclear ribosomal DNA (KIM et al. 1996) connect *P. pendula* with *Sventenia*, *Babcockia platylepis* (WEBB) BOULOS (= *Sonchus platylepis* WEBB) as well as *S. sect. Tuberiferi*, *S.* subgenus *Dendrosonchus*, and *Taeckholmia*. To further clarify the position of *P. pendula*, we have undertaken studies of morphology and anatomy of its fruits. Carpological method is well-established in systematics of Asteraceae (cf. LAVIALLE 1912, and for example, PAK & KAWANO 1990 a, b), and usually provides good results in studies on Lactuceae.

Materials and Methods

The achenes of *P. pendula* were studied in respect of morphology, anatomy and surface ultrasculpture. The achenes were taken from herbarium specimen, the syntype of *P. pendula*: "In montibus Canariae, WEBB" (LE).

The achenes were treated in an alcohol-glycerine-water solution (1:1:1) during three days and cut with freezing microtome through their middle (through cotyledons) and basal parts. Sections were made at a thickness of 10–16 μm ; prepared slices were coloured with safranin. Drawings were made with drawing device RA-7 by the second author. Surface ultrasculpture was studied with scanning electron microscope JSM-35C.

Morphological and Anatomical Data

Fruit

The mature achenes of *P. pendula* are homomorphic, 4–4.5 mm long., 1.1–1.2 mm wide, stramineous, cylindrical, broadly conical at the base and rounded at the apex, round in cross section, smooth, 4–5-striate with furrows (Fig. 1). Pappus 2.5–3 mm long, uniseriate or partly biseriate, subhomomorphic. Pappus setules are 0.02–0.03 mm thick, most of them are thin with few slightly thickened ones, white, slightly denticulate, rather fragile, slender.

Pericarp

Cross section of mature achenes shows more or less round outline (Fig. 2). The pericarp is 80–100 μm in thickness. The layout of the achene is 4–5-merous (from achenes in the same calathidium). Pericarp is clearly divided in section into 4–5 lobes with narrow furrows. It is composed by exocarp and well differentiated mesocarp. Each mesocarp

lobe contains three strands of sclereids, which are separate, round and nearly equal in the base of achene, and fused into trilobed band in the center of the achene. This band is homogeneous, consisting of 10–12 layers of strands and of (1) 3–4 layers between them, underlain by obliterated parenchyma cells (Fig. 3). One or two layers of the elongated sclerified parenchyma with prominent pores in the walls overlay the sclerenchyma bands and converge between them. Exocarp consists of a single layer of epidermic tissue. The epidermic cells are rather narrow, 4–6 μm high, 8–12 μm wide, cuticularized, with concave upper walls.

Seed Coat

There are some rows of the seed coat cells obliterated, being present as cell walls only.

Endosperm

The endosperm is two-layered, consisting of thin-walled cells with grained substance within.

The study of ultrasculpture of achene surface shows the epidermic cells to be rather narrow, 50–120 μm long, 8–12 μm wide, elongated in axial direction, without apical outgrowths (Fig. 4). The cell surface is slightly rugose, without prominent cuticle structures.

Discussion

Analysis of morphological and anatomical data provides more evidence in favour of the inclusion of *P. pendula* into the subtribe Sonchinae K. BREMER (BREMER 1993, 1994), rather than keeping it within *Prenanthes*. All species of Sonchinae possess achenes with pericarp divided in section into 4–5 lobes with rather prominent (at least at the base of achenes) furrows, complemented with soft or slender, heteromorphic or subhomomorphic pappus setules (SENNIKOV & ILLARIONOVA, in press) whereas species of *Prenanthes* (SENNIKOV 1997, in press) have achenes without furrows, with hard, homomorphic pappus setules (SENNIKOV & ILLARIONOVA, in press). Plant morphology allows us to suggest *P. pendula* be compared with *S. tuberifer* by its pinnatisect leaves with large lobes, as well as with *S. sect. Atalanthus* by small calathidia, inflorescence shape and basally woody stem. Judging by the most distinguishing feature in Lactuceae, *S. platylepis* (sect. *Babcockia* (BOULOS) SENNIK.) is the species most closely similar to *P. pendula* by the structure of its achenes. The achenes of *S. platylepis* have 4 pericarp lobes without ribs (WEBB & BERTHELOT 1842-1850); every lobe possesses 5 subequal sclerenchymatous strands (ALDRIDGE 1976). In our opinion, *P. pendula* is characterized

by a rather primitive achene structure of *Sonchus*-type, because the pericarpium is not differentiated into ribs though the number of sclerenchymatous strands is reduced from 5 (primarily) to 3 (as in *S. leptcephalus* CASS. from sect. *Atalanthus*), and the strands are partly fused. Thus, this species shares the most important features of some species of subgen. *Dendrosonchus* and may belong there. We support the opinion to unite some segregates close to *Sonchus* with *Sonchus* s. str. into a single genus according to morphological and anatomical features, and to treat the subgenus *Dendrosonchus* in broader sense (WEBB & BERTHELOT 1842-1850, ALDRIDGE 1976, REIFENBERGER & REIFENBERGER 1996). To this treatment, *P. pendula* should be placed into subgen. *Dendrosonchus*, forming a section of its own.

Nomenclatural Conclusions

Sonchus sect. *Chrysoprenanthes* (SCH. BIP.) SENNIK., **comb. nov.**

Basionym: *Prenanthes* subgen. *Chrysoprenanthes* SCH. BIP. in WEBB et BERTH., Hist. Nat. Iles Canar. 3, 2, 2: 420 (1849).

Type: *Prenanthes pendula* SCH. BIP. (= *Sonchus pendulus* (SCH. BIP.) SENNIK.).

S. pendulus (SCH. BIP.) SENNIK., **comb. nov.**

Basionym: *Prenanthes pendula* SCH. BIP. in WEBB et BERTH., Hist. Nat. Iles Canar. 3, 2, 2: 421 (1849). – Syntype: “In montibus Canariae, WEBB” (LE!).

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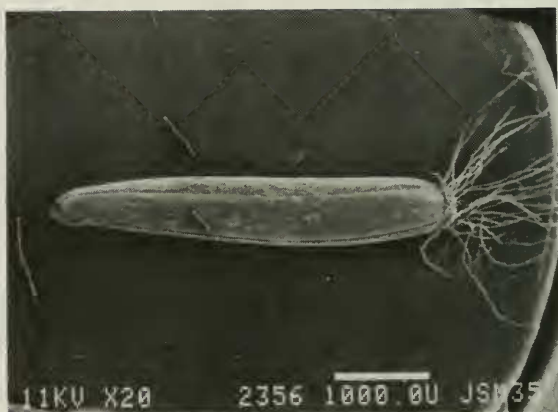


Fig. 1. An achene of *P. pendula* (SEM micrograph), $\times 20$.

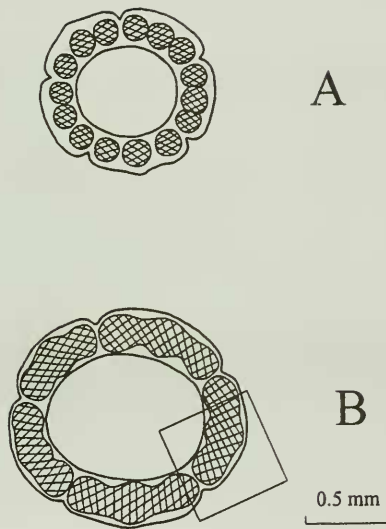


Fig. 2. Simplified cross section of achene of *P. pendula*. A: at the base part of the achene. B: at the middle part of the achene. Sclerenchyma tissue is crossed.

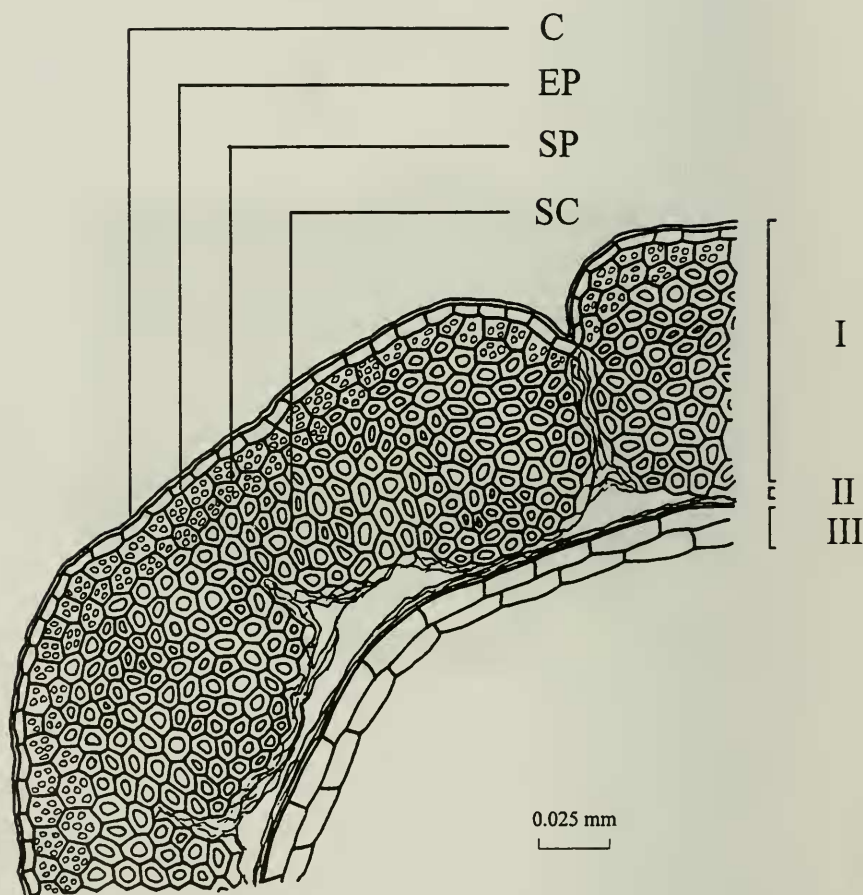


Fig. 3. Part of cross section of mature achene of *P. pendula* with anatomical details. I – pericarp; II – seed coat obliterated; III – endosperm. Cuticle of epidermic cells (C); epidermal cells of pericarp (EP); sclerified elongated parenchyma (SP); sclerenchymatous cells of pericarp (SC).

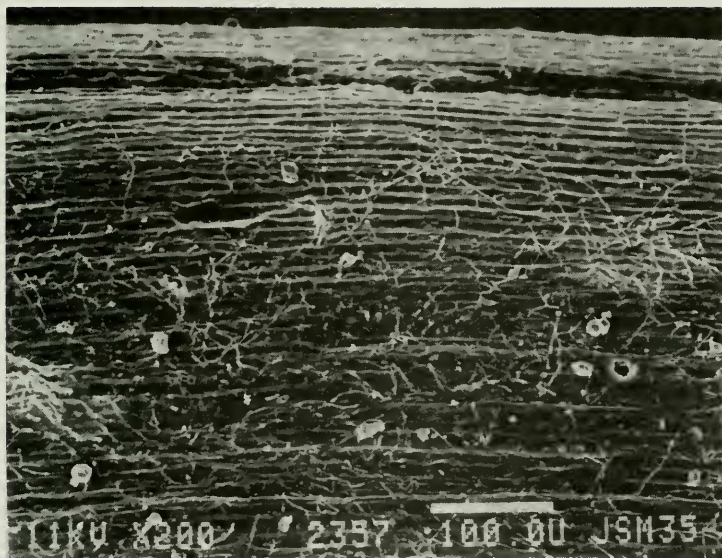


Fig. 4. Structure of achene surface of *P. pendula* (SEM micrograph), $\times 200$.